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## DETAILED DESCRIPTION

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[Detailed explanation of the device]

[0001]

[Industrial Application]

This design is related with the electric power steering device formed in order to abet the operating physical force by handle operation in the steering gear for vehicles in detail about an electric power steering device.

[0002]

[Description of the Prior Art]

Although many hydraulic things by a hydraulic pump have been conventionally used for the power steering device, There are many in which each car maker formed a motor and its controller like what is indicated by JP,61-110668,A in recent years, respectively, For example, the torque and the vehicle speed which are generated at the time of handle operation were detected by the sensor, respectively, and also these information is supplied to a controller and what abetted the drive of steering gear by the motor according to the judgment based on the information is known.

[0003]

[Problem(s) to be Solved by the Device]

However, since it comprised an electric power steering device like above-mentioned before so that an operating physical force may be abetted by one motor until now, there was a problem which is described below.

[0004]

That is, since the reaction force transmitted to steering gear via a link mechanism from the tire of a wheel at the time of the low speeds in the case of departing from the state of a stop (vehicle speed O), etc. is large, in order to abet a control force corresponding to this, a high-output motor is needed.

[0005]

the reaction force which applies from the medium-speed time at the time of a high speed, and is transmitted to steering gear from a tire -- so much -- being alike -- since it does not become large, it ends by the emasculation by the motor of low-power output, but a high-output motor is desirable, considering steering at the time of the above-mentioned low speed. However, in the case of a high-output motor, surely as it is, since the rotational inertia force is large, high responsiveness cannot be expected, for example, there is a problem at the time of the cutback of a handle, etc.

[0006]

The purpose of this design is to provide the electric power steering device with which the steering emasculation power in which it was independent or corresponded with the combination of two motors according to the size of the torque generated in the time of a low speed and an inside high speed, respectively was obtained paying attention to the conventional problem which was mentioned above.

[0007]

[Means for Solving the Problem]

The 1st motor by which this design was directly linked with steering gear in order to attain this purpose, The 2nd motor connected with said steering gear via an electromagnetic clutch, A control means performed based on predetermined vehicle speed detection according "one" [ of a vehicle speed detection means, said 1st motor and the 2nd motor, and an electromagnetic clutch ] - "OFF" to said vehicle speed detection means at least is provided, Said 1st motor and the 2nd motor are driven below with said predetermined vehicle speed by this control means, and it controls above said predetermined vehicle speed to drive only said 1st motor.

[0008]

[Function]

According to this design, the reaction force from a wheel is large, connect the 2nd motor with steering gear by considering an electromagnetic clutch as "one" by a control means at the time of the low speed from the stop time as which the large torque for steering is required to a predetermined vehicle speed, and drive the 1st motor and the 2nd motor, but. It is small, and the reaction force from a wheel separates the 2nd motor with an electromagnetic clutch to steering at the time of the inside high speed more than the predetermined vehicle speed for which the torque like \*\* is not required, and connects only the 1st motor with steering gear, and it controls to abet a steering.

[0009]

[Example]

The example of this design is concretely described to it, referring to drawings to below.

[0010]

Drawing 1 shows one example of this design. It is a driving shaft for steerings in which the worm gear 5 gear on the rack 4 which supported 1 pivotally to steering gear, 2 was supported pivotally by the gearbox, and 3 was supported pivotally by the gearbox 2, and was formed in one end here. The worm gear 5 are driven according to the mechanical steering system 7 containing the steering wheel 6. 8 is a torque sensor which detects the torque (handle input torque) which it is provided in the steering system 7 and generated in this. On the other hand, the worm shaft 10 supported pivotally by the bearing 9 in parallel with the driving shaft 3 for steerings is formed in the gearbox 2, and the ball nut 12 has fitted into this worm shaft 10 via the rolling balls 11, enabling free movement. 13 is a move transfer member which connects the ball nut 12 and the driving shaft 3 for steerings, and transmits movement of the ball nut 12 to the driving shaft 3 for steerings.

[0011]

The 1st motor and the 2nd motor which 14 and 15 require for this design, 16 is infixed between the 1st motor 14 and the 2nd motor 15, and the electromagnetic clutch which can detach the 2nd motor 15 from connection or the 1st motor 14, the controller for control in 17, and 18 are speed sensors about the 2nd motor 15 at the 1st motor 14. It is the block diagram shown in order that drawing 2 might explain plainly operation by such this electric power steering device, and the control force obtained by the steering gear 1 is

transmitted to the wheel 21 via the well-known rack 19 and link mechanism 20 grade.

[0012]

Subsequently, the control action at the time of steering by the electric power steering device constituted in this way is explained, referring to drawing 3.

[0013]

First, a relation between the torque  $T$  required of a motor by the height of the vehicle speed  $S$  and the vehicle speed for steering emasculation as shown in (A) of drawing 3 is. Then, it is what turns the electromagnetic clutch 16 on and off in this design based on the signal inputted from the torque sensor 8 and the speed sensor 18, At the time of start up, the clutch 16 is made with "one" from the car's for which largest torque's is needed stop time, and the 1st motor 14 and the 2nd motor 15 are linked directly. And as the vehicle speed  $S$  shows (B) of drawing 3, for example, when it becomes  $S_C$ , the clutch 16 is turned "OFF", only the 1st motor 14 is driven, and this state is continued in the vehicle speed beyond it. When the vehicle speed turns into junior-and-senior-high-schools prompt low speeds, it cannot be overemphasized that the clutch 16 serves as "one" in the place where the vehicle speed became  $S_C$  conversely.

By [ which write ] carrying out, in the low speed operation area shown in the (B) as A, high torque  $T_H$  is supplied to the power steering gear 1, and while being shown as B, low torque  $T_L$  is supplied in a high-speed-driving field.

[0014]

As shown in (C) of drawing 3 as the rotational inertia  $I$ , it is high in the low speed operation area A, It is that high responsiveness  $R_H$  is obtained at an inside high speed driving time, and a low speed driving time comes low response  $R_L$  conversely as it will be kept low in the inside high-speed-driving field B, therefore is shown in (D) of drawing 3 as a response to steering, Maintenance and the response of a control force suitable for each speed will be obtained until the vehicle speed results at high speed from the state of 0.

[0015]

Although "one" of the clutch 16 and "OFF" are controlled only by the vehicle speed and the drive by direct connection with 1st motor 14 independent one or the 1st motor 14, and the 2nd motor 15 was controlled by the method of the control described above, It may be made to control "one" of the clutch 16, and an "off" switching point by the combination of the both sides of torque value and the vehicle speed. What is necessary is making it just make it "one" of the start switch which is not illustrated [ for example, ] interlocked with about start up of the 1st motor 14 and the 2nd motor 15.

[0016]

Drawing 4 shows other examples of this design. This example is that which passed the 1st motor 14 to the axis side, and passed the electromagnetic clutch 16 to the axis side of another side and in which while extending from the gearbox 2 of the worm shaft 10 allocated the 2nd motor 15, and there are not the 1st example that described other composition previously, and a changing place. Since the same may be said of the operation, the explanation is omitted.

[0017]

[Effect of the Device]

The 1st motor that was directly linked with steering gear according to this design as explained above, The

2nd motor connected with said steering gear via an electromagnetic clutch, The control means performed based on predetermined vehicle speed detection according "one "[ of a vehicle speed detection means, said 1st motor and the 2nd motor, and an electromagnetic clutch ] - "OFF" to said vehicle speed detection means at least is provided, Since it controls to drive said 1st motor and the 2nd motor below with said predetermined vehicle speed by this control means, and to drive only said 1st motor above said predetermined vehicle speed, Since the control force corresponding to the torque always demanded and a suitable response are obtained from the state at the time of a stop to a high-speed-driving state and also a motor can be properly used to one or two, What has generation of heat of small capacity low also as a FET transistor by which it is few, and the current for the circuit drive for control also has little used power, it not only ends, but it ends, and is arranged can be used. Although the number of the motors used is also two, it is also possible small for neither to take a space and to divert these motors to the motor of other uses.

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[Translation done.]